Upper Goose Creek and Twomile Canyon Creek and Floodplain Remapping Study
Frequently Asked Questions (FAQ's)

1. **What is the schedule and next steps for the floodplain mapping update process for Upper Goose Creek and Twomile Canyon Creek?**

   The mapping study was presented to the Water Resources Advisory Board (WRAB) on Feb. 23, 2015 and the WRAB made a motion to recommend that City Council accept the mapping study. The mapping study is scheduled for review by City Council on July 21, 2015. If accepted by City Council, it would be submitted to FEMA for review. The FEMA review and adoption process typically takes from 18 months to three years after the mapping is submitted.

2. **Why does the city update floodplain maps?**

   Floodplain maps provide the basis for flood management by identifying the areas subject to the greatest risk of flooding. This information is essential for determining areas where life safety is threatened and property damage is likely, and forms the basis for floodplain regulations and the National Flood Insurance Program. The city's floodplain maps need to be periodically updated to reflect changes in the floodplain resulting from land development, flood mitigation improvements, new survey information and new mapping study technologies. These maps also help identify and prioritize opportunities for flood mitigation.

3. **What is the process that the city uses to update flood maps?**

   The city contracts with independent engineering consulting firms to identify flood risks using methods provided by FEMA and the Urban Drainage and Flood Control District (UDFCD). The engineer uses computer modeling to evaluate how runoff from a "design storm" is likely to flow across existing topography. A design storm emulates a flash flood, which is quite different from the long-duration, less-intense storm that led to the flooding in September 2013.

   The city also contracts with a second, independent third-party engineering consulting firm to conduct a peer review to verify the technical elements of the study. Additionally, both the city and the UDFCD provide review and input for the floodplain mapping processes. The final review is done by FEMA.

4. **How are the design storms determined?**

   A design storm emulates a flash flood, which is quite different from the long-duration, less-intense storm that led to the flooding in September 2013. The design storm used in the hydrologic analysis (rainfall-runoff) is a short-duration, high intensity storm (one- or two-hour

event with rainfall intensities ranging from 2.4 to 2.7 inches per hour) which is used to calculate the peak flows for the flash flood.

5. **How is the topography determined?**

   The accuracy of topographic mapping has improved over the years. Previous mapping studies were first based on 2 foot contour mapping and later based on 1 foot contour mapping. The city now uses topographic mapping collected in April 2013 using LiDAR. LiDAR uses aircraft mounted laser technology and is a state of the art remote-sensing method capable of accurately defining topographic data to within 0.35 ft, at a high resolution (minimum 16 elevation points per square meter).

6. **Who are the consultants for the Twomile Canyon and Upper Goose Creek mapping study?**

   The city selected ICON Engineering, Inc. (www.iconeng.com) as the professional engineering consultant for this project based on their extensive experience and qualifications with floodplain mapping studies and successfully having these studies approved by FEMA. Anderson Consulting Engineers (www.acewater.com) conducted the peer review. A third consulting engineer, Wright Water Engineers (www.wrightwater.com), was hired to evaluate the magnitude of the 2013 storm event to allow a better understanding of its applicability to the mapping update.

7. **What is the Conveyance Zone and how does it get determined?**

   The Conveyance Zone is the area of the 100-year floodplain that is reserved for the passage of flood waters and acts as a preservation zone for flood flows along the creek corridor. The establishment of a Conveyance Zone allows for most development activities to occur outside of the main flow paths without requiring a hydraulic analysis. Development in the Conveyance Zone typically requires an analysis to ensure that flooding conditions are not worsened.

   The limits of the Conveyance Zone are based on a maximum 6” increase in flood water depths due to the simulated filling of the other portions of the floodplain. This analysis typically includes equal encroachment on each side of the floodplain. Where flows could potentially flow across private property or down a public street or right-of-way, there is some discretion to shift the conveyance zone into the public right-of-way in order to minimize impacts to private property.

8. **How do the city’s floodplain regulations apply to other governmental agencies like city-owned property, the University of Colorado and the Boulder Valley School District?**

State and Federal agencies are not required to obtain City of Boulder building permits, but are subject to FEMA regulations. This means they are required to obtain floodplain development permits from the city for any development in the floodplain within city limits. The city is the FEMA-recognized local jurisdiction responsible for enacting and implementing the floodplain regulations required for our community to participate in the National Flood Insurance Program (NFIP). All city projects within the floodplain must also comply with all floodplain regulations.

9. **What is the High Hazard Zone and why is it not continuous, but sometimes is shown as "blobs" on the map. How can that be possible?**

   The High Hazard Zone represents areas in the 100-year floodplain where a high risk to human safety exists and where there is the potential for floodwaters to sweep people off of their feet. Research was conducted to determine the flood depths and velocities that were most likely to sweep people off of their feet. As a result of the research, the High Hazard Zone is defined as all areas in the floodplain where the floodwater velocity (in cubic feet per second) multiplied by the floodwater depth (measured in feet) would equal or exceed four, or where the floodwater depth alone would equal or exceed four feet. An example would be a flood depth of three feet with the water moving 1.5 feet per second, which would result in a product number of 4.5, thus placing the area within the High Hazard zone. Because the depth and velocity of floodwaters are affected by topography, the High Hazard zone may not be a continuous zone due to variations in topography (i.e. water velocity may slow down as the topography flattens out, but then increase again when the terrain becomes steeper).

10. **What are the regulations associated with development in the High Hazard Zone?**

    Development in the High Hazard Zone is significantly restricted. No new structures or additions to existing structures intended for human occupancy are permitted in the High Hazard zone. No new parking lots and no change of use of an existing non-residential structure to a residential use are permitted. Improvements to existing structures are also limited. The city's complete floodplain regulations and other related information are available at https://bouldercolorado.gov/plan-develop

11. **The High Hazard Zone is shown on my property, but not touching my structure. How does this affect how future improvements on my property will be regulated?**

    If the High Hazard Zone does not touch the existing structure, the High Hazard Zone regulations would not apply to the structure. An addition to the structure that extends into the High Hazard Zone would not be allowed unless the existing grade is modified to remove the area from the High Hazard Zone and Conveyance Zone regulations (if relevant) are met. Any improvements on your property within the High Hazard Zone would need to comply with the High Hazard Zone regulations.

12. **My property was not flooded in September 2013. Why does the proposed mapping show my property in the 100-year floodplain?**

    The 100-year floodplain is based on a theoretical short duration and high intensity thunderstorm event that would result in a flash flood. The September 2013 flood was a lower intensity series of storms occurring over several days. . While the September 2013 event was used to help inform the new mapping, a flash flood design storm would be expected to have different impacts. In some areas, flooding was not seen in September 2013, but the floodplain mapping shows that same area as being flooded in a design storm flash flood event. Conversely, there may also be some areas that flooded in September 2013, but that are not mapped as being the highest risk during a flash flood event.

    The September 2013 storm also resulted in large amounts of sediment and debris, and human responses such as sandbagging, etc. that affected the way flooding occurred, which is not accounted for in floodplain modeling. Fences and other temporary obstructions also impacted the movement of flood waters, but are not considered as permanent features by FEMA and therefore are not included in floodplain mapping studies.

13. **Why does FEMA use a theoretical flash flood event as the basis for floodplain mapping in the Front Range for regulatory purposes?**

    Flash flooding is common in the Front Range due to its proximity to the mountains and weather patterns that result in thunderstorm activity. Flash floods pose a risk to human lives and public safety as they happen quickly, allowing little time to respond.

14. **In the September 2013 flood, water flowed down Broadway south of Elder. The floodplain maps show this area as "shallow flooding." Similarly, Foothill Elementary school experienced flooding in September 2013, but it is designated as a "shallow flooding zone". What does this designation mean?**

    The revised, draft floodplain mapping shows 100-year flooding along Broadway, south of Elder as well as at Foothill Elementary School. However, these areas are classified as a FEMA Shallow Flooding Zone X designation based on estimated flow discharge and depth. A FEMA Zone X designation includes areas of both 500-year flooding and 100-year flooding with average depths of less than one foot. Shallow flooding zones do not have base flood elevations assigned to them for development purposes. Flood insurance in Zone X Shallow Flooding Zones is less expensive than the FEMA "A" (100-year flood) zones.

15. **The corner of Broadway and Iris saw significant flooding in September 2013. Why is this not mapped as part of the High Hazard Zone?**

The city does not define the High Hazard Zone using historic storm events. Instead, the High Hazard is defined based on the product number of depth and velocity. This information is derived from the hydraulic model based on the 100-year theoretical design storm required by FEMA and the UDFCD. The High Hazard Zone is intended to inform people about where there is the highest risk of people being swept away, not where the highest risks to structures occur.

16. **The proposed 100-year floodplain mapping shows the areas along 17th Street, south of Elder, in the floodplain. This area did not flood in September 2013. Why does the proposed mapping show it in the floodplain?**

    Any individual storm event can manifest in different ways depending upon the length, duration and intensity of the storm, the location of the storm within the watershed, the saturation of the soil, sediment transport and human intervention.

    Following the flood, extensive documentation was collected by city staff and consultants within the Twomile Canyon Creek basin. Documentation did identify flooding from the intersection of Elder Avenue and 17th Street, extending south to Cedar Avenue. Proposed 100-year floodplains have been defined based on floodplain mapping procedures consistent with FEMA and city floodplain management requirements. The proposed 100-year floodplain is not intended to replicate the September 2013 event, but to identify flood risk for the future based on a theoretical 100-year design storm.

17. **The proposed mapping shows that my property is no longer in the 100-year floodplain. When will this mapping be adopted? When will I no longer have to pay for flood insurance?**

    Once the new floodplain mapping is accepted by City Council, it will then be used for regulatory purposes and submitted to FEMA for their review and approval. The FEMA Flood Insurance Rate Maps (FIRMs) are the official maps that are used to determine flood insurance requirements. Therefore, the flood insurance requirements for your property will not change until FEMA approves the new mapping and completes their appeal process, typically 18 months to three years after the mapping is submitted for FEMA review.

    While flood insurance may not be required for your property once the new mapping is adopted, it may be advisable to maintain flood insurance coverage as the risk of flooding still exists and flood premiums are discounted for properties outside the designated floodplain.

18. **How is the deposition of sediment and debris taken into account in floodplain mapping?**

    Floodplain mapping does not directly account for the alluvial (loose soil) nature of certain floodplains. The current modeling is based on clear water flow and existing topography. The parameters used in modeling the “design storm” for Flood Insurance Rate Maps are specified by FEMA. The city would anticipate that including geological considerations in floodplain

mapping studies would result in a much more extensive designation of high risk areas due to the uncertainties around how water flows through alluvial fan areas. Changing the city's floodplain remapping methodologies would be a very significant policy shift and require an extensive community conversation and action by City Council.

19. What is WRAB's role in reviewing floodplain mapping updates?

The Water Resources Advisory Board (WRAB) serves as a recommending body to City Council, Planning Board and city staff on community utilities issues, including floodplain mapping studies. The WRAB's review of floodplain mapping updates is not intended to verify the analysis and calculations, but to provide a forum to consider and address public concerns and questions, and confirm that the public has been adequately informed of any changes in the identification of flood risk. The city contracts with an independent, third-party engineering consulting firm to conduct a peer review to validate the accuracy of the topographic mapping and to verify the technical elements of the study.

20. What obligation do I have to disclose information about flood risk to prospective buyers?

In Colorado, the "Seller's Property Disclosure" requires that sellers acknowledge that a property is in a governmentally designated floodplain. By not indicating the property is in the floodplain, the seller and/or seller's agent can be held liable and a cause for action may exist for negligent misrepresentation.

Once council accepts the mapping, the city will begin to regulate to the more restrictive of the existing and new maps. Following formal adoption by FEMA, the city will regulate solely based on the new mapping.

21. My property is not currently in a flood zone, but the new mapping shows it in a designated flood zone. Can I construct modifications to my house before the new mapping is accepted by council?

Properties that are not currently shown in a floodplain can make modifications to their homes and do not need to comply with the city's flood regulations. However, the new mapping identifies areas that are subject to the greatest risk of flooding and it is therefore recommended that any modifications be made in accordance with the city's flood regulations in order to protect those structures from potential damage from flooding.

22. Where can I obtain additional flood information?

The following links provide useful information for flood related topics in the city:

www.boulderfloodinfo.net

Flood Management Overview

Flood Management Program Glossary of Terms

September 2013 Flood Information